make With ESPOO

Handbook for Co-creation

#MakeWithEspoo collects the results of the experiments conducted in Espoo in order to create tools of development, management and consulting according to the City as a Service objective. It is an umbrella of the co-creation of frameworks, handbooks and tools created in 6Aika projects that reforms activities in a socially, culturally, ecologically and economically sustainable way.

6Aika is a joint strategy of the six biggest cities in Finland – Helsinki, Espoo, Tampere, Vantaa, Oulu and Turku – aiming at the development of more open and intelligent services. The aim is to create new competence, business and jobs in Finland. At the end of 2017, there were over 30 ongoing 6Aika projects and their total budget was over 57 million euros.

Foreword

In the next decades, the world will change more than it has changed in the last centuries. Inspiring innovations change established operations, creating new opportunities for building a sustainable and human-oriented future.

The public sector must actively seek and find its evolving role when resolving the possibilities of change for individuals, communities, companies, society and the environment. In the place of traditional, siloed and administration-based activity, we need new, open and effective ways to understand customer relationships, information and activity. Open activity strengthens participation, responsibility and trust. It clears the way for customer relationship-based services, new business operations and the new role of public operations.

In Espoo, we create new success stories by introducing different actors, operations and networks to each other. With the MakeWithEspoo methods and tools, we ensure that we do the right things with the right people at the right time, using the right competences.

As part of the MakeWithEspoo tool family, this handbook supports the creation of practices and rules for co-creation and its management. With the models, examples and tools presented in the handbook, both residents and representatives of cities, companies, communities and research, development and innovation actors can use co-creation to identify and implement solutions for current and future challenges. At the same time, actors in the urban ecosystem can find their roles in co-creation and understand how it can be best utilised for everyone's benefit.

Many thanks to everyone who took part in developing the handbook, especially Project Manager Katja Hagman, who was in charge of its development, Development Manager Piia Wollstén as well as the authors of the handbook, Tuija Hirvikoski and Anne Äyväri from Laurea University of Applied Sciences.

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Contents

Co-creation in the context of cities – what is it about?

The city is there for the people and is built by the interaction between people. Target-oriented interaction and co-operation are at the core of co-creation. In a user-oriented city, ideas, information and competence flow freely and produce added value for all the actors in the city.

Co-creation methods and tools help all the actors in the urban ecosystem – residents, city organisations, companies, associations, communities and research institutes – to modify and create a better living and operating environment and better services together. At the same time, companies and urban planners get city residents involved and learn to understand the residents' goals and values and create high-quality user experiences.

As an operating method, co-creation is particularly suitable for uncertain situations that may require quick changes in plans. The city acts as a meeting place or open innovation platform and ecosystem where various actors collaborate as equal partners, each in line with their own objectives. Co-creation is a key approach in operations in accordance with the "City as a Service" or "City as a Living Lab" way of thinking.

Interest in co-operation in urban ecosystems has increased all over the world. Companies, researchers, associations and city residents are increasingly interested in urban environments, wanting to develop and try new approaches, processes and technologies as well as innovative products, services and business models.

Co-creation makes use of quick, easy and affordable experiments. Development by experimentation means a systematic approach to innovative projects and development projects on the basis of real-life observations. The co-operation proceeds iteratively through the development, experiment and evaluation stages

specified on a case-specific basis. In an iterative process, the stages are partially overlapping and are repeated in varying order.

In order for the co-operation to work well, it must be planned and implemented such that it benefits all those involved, including the city residents, organisations and employees. A well-executed development project starts with the needs, goals and values of cities and their residents.

The handbook helps solve practical challenges in co-creation. The key challenge is managing the co-operation between several actors and the overall process. The urban ecosystem brings together various viewpoints from the competitiveness of companies to the vitality of the city as well as the residents' well-being and quality of life. The co-operation also aims to achieve new jobs, investments and tax income. Indeed, the core of the co-creation operating model is in recognising the various goals of the actors and highlighting and matching the expected benefits on the practical level. Mutually created rules guide development and experimental activities that benefit each party.

The handbook suits various needs

The co-creation operating model is based on the city's roles as an innovation platform and enabler of innovation activities in urban ecosystems. In its role as an enabler, the city may, for example, introduce its challenges, processes or data as a basis for the development work or offer shared meeting places and spaces for companies, city residents and other interested parties.

The Handbook for Co-creation supports the work of the city leaders and developers. The city may strengthen its role as an orchestrator of an urban ecosystem that creates and utilises innovations in an agile manner. Opening up the city as a platform for innovation and co-creation requires both change management and fostering the culture of co-creation.

The handbook presents a general operating model for co-creation. Based on this, the city may create a model that suits its own operating environment, opening up new opportunities for residents, companies, communities as well as research, development and innovation actors. The model guides various actors towards the more efficient and systematic development of their activities or innovations together with other actors. By varying and combining various spaces, physical and virtual meeting environments and co-creation methods, the city supports the development of new, improved products and services.

The handbook is intended for all parties participating in co-creation, not just cities. It is not a recipe book whose instructions must be followed exactly. The handbook provides guidelines that leave room for creative application.

Direct and indirect benefits of co-creation

Co-creation and experimental activities in the urban ecosystem aim at a number of long-term benefits, both direct and indirect. The development benefits all the parties involved, together and separately.

Co-creation in an open city enables the dynamic, agile and locally, nationally and internationally scalable development and introduction of innovations. It improves national competitiveness and vitality.

When cities, companies and other actors open up, innovation ideas can be nimbly utilised, thereby creating new kinds of entrepreneurship. The goal is to achieve a change in consumer behaviour. The opening up of cities and companies to co-creation creates synergies between service ecosystems, business ecosystems and inno-

vation ecosystems. New markets and service solutions are created for companies. The new business models of cities, based on customer relationships and activities, result in new value flows and change existing customer and cash flows.

In a co-creation process based on genuine interaction, each party learns and develops:

City residents get to learn about product development and see how their ideas and feedback modify new products and services that they may later try out or start using. This makes the significance of doing things together concretised.

The city benefits from the user-oriented solutions enabled by new technology. It may change its operations, making it less administration-based and more customer- and resident-oriented.

Companies get to learn more about the activities and challenges of the city and its organisations and service areas as well as the data created in the city. They get user feedback through quick experiments and can utilise the experiments as references for sales. They can create new business models and markets through pilot projects.

Research, development and innovation actors find new research topics that support the development direction of innovations (including new technologies). They receive input on research needs from cities, companies and other actors. When they are involved as an actor, new innovation partnership opportunities and training needs open up in the ecosystem. In addition, co-operation with companies enables the utilisation of open data and research of new business operations.

Key concepts

Co-creation. This concept is the key to utilising this handbook. It means target-oriented co-operation between people (Aaltonen, Hytti et al. 2016).

Experiment. Aims to produce essential new information relating to the idea – product, service or operating model – being developed. An experiment tests the presumptions relating to the idea being developed, beginning from the most significant and uncertain ones. An experiment may also fail. Information received in an experiment has a significant effect on both the concept of the idea being developed and the progress of the development project. (Hassi, Paju et al. 2015.)

Experiments are very different, but what they share is that they seek their way to innovation platforms suitable for the experimental case (OSKIVI framework).

Pilot. The purpose is a final verification in order to ensure that the product or solution works like it should. In a pilot project, expectations for success are high. (Hassi, Paju et al. 2015.)

Innovation platform. From the point of view of business, a platform at its simplest refers to any operating environment, technology, system, company, product or service whose development has been systematically opened up to outside developers and value creation and whose key aims are the benefit produced by the platform's users to each other and the network effect brought about by participation. (Raunio, Nordling et al. 2016)

An innovation platform is functional and technical. In order to yield benefit, it requires a business model. Corresponding business can be referred to as Innovation Platform as a Service (IPaaS).

Innovative initiatives. These combine new opportunities with significant customer needs. A modern way of finding innovative initiatives is experimentation.

Innovation ecosystem. The term refers to a situation in which the interaction between actors in the ecosystem leads to either finding the desired solution or introducing the product or service into the market. In this case, the drivers of the ecosystem are financial, societal, ecological or political challenges. In innovation ecosystems, interaction flows freely and challenges are local, regional or national, often also sharing a European or global element. They offer answers, produce arguments and ensure that the participation of the general public in innovation activities is secured. (Framework for the innovation management of ecosystems)

Management of co-creation

The management of successful co-creation involves a number of challenges. Factors that also require new thinking from management and strategy preparation include the interdependencies of various parties, cross-pollination of multidisciplinary information and ideas as well as experiments and their orchestration. In management and strategies, it is necessary to be able to reconcile the expertise, competence and different interests of a wide variety of actors.

Co-creation requires multilayered and multifaceted management, combining downward management and upward leadership. In co-creation, attention is firstly diverted from the personality of the leader. Then, management refers to plural leadership created through collaboration. Plural leadership is created collectively – it is dynamic and enables leadership created by everyone's input. It can be compared to how a football team works. Secondly, the focus of leadership shifts from the management of technology and material resources to the recognition of hidden human resources and values.

In ecosystem thinking, public sector management is crystallised in enablement, encouragement and orchestration. It is a systematic, long-term facilitation of peer networks as well as the recognition and evaluation of business opportunities together with companies, the third sector and institutes of higher education.

As co-creation becomes more common, a new perspective into management is also required from companies and communities. In Finland, a government programme encourages municipalities and leading companies to open up their research and development activities in a more ecosystem-oriented direction. Alongside business concentrating on efficiency and current products, they are expected to achieve ambitious new initiatives if they open-mindedly invite other

ecosystem actors to join the development, experiments and pursuit of new markets. Mediator activities also enable SMEs, city residents and other communities to benefit from the ecosystem and promote its success.

Co-creation in an urban ecosystem always requires shared leadership, mutual agreement and brokerage between all organisations taking part in the activities. According to Parjanen, a broker establishes connections between various groups, builds a dialogue between various actors, prepares for the innovation process and coaches and motivates the participants.

Mediator Circle

Co-creation requires a mediator to enable the development of multi-actor co-operation as the volume of the activities increases. Mediators are bridge-builders between groups of actors and practical communities. They are not content with just building bridges between groups of actors they already know; they are also explorers. In this role, they are constantly looking for new actors to be involved in co-creation and learning about the actors' values, norms, practices and abilities.

Mediators are interpreters who understand the language and intentions of actors or groups of actors taking part in co-creation and are able to analyse the actors' goals to form a shared insight. Mediators are also activists: they can make things happen by creating opportunities and room for co-creation. Mediators support the introduction of people and ideas to each other and create opportunities for learning new things.

For many people, co-creation is a new way of co-operating with actors from outside their organisation or unit. The mediator's task is to support the learning of people participating in co-creation. The learning is not limited to adopting new practices alone; it is also about a change of identity: how can I become a co-creator with an open attitude to multi-actor co-operation.

The combined competence of the Mediator Circle covers all the competence areas and tasks required to launch the co-creation operating model and support its implementation. The Mediator Circle evaluates the effects of the operating model together with the organisation's management. This means that each mediator's roles also include the role of evaluator.

Open digital platform

The key purpose of an open, interactive digital platform is to enable the actors' development needs, ideas, learning and experiences to be shared and commented on. In accordance with the principles of Open Innovation 2.0, a digital platform supporting co-creation is primarily open to everyone. For example, the Otakantaa. fi service, maintained by the Ministry of Justice, provides the following instructions for using the service: "Using the Otakantaa.fi service does not necessarily require registration, since the contents of the projects are public and users can participate in most discussions and surveys without registering for the service. However, there may be individual projects in the service that require registration in order to participate in the discussions and surveys."

In this handbook, we use the name Digitori ("digital square") for the digital platform, which is both open and communal, a place for meetings and discussions between people. After introducing the co-creation operating model, we describe the Digitori elements.

Incremental and radical innovations require different leadership

Organisations tend to favour activities aimed at improving their current performance within their current competences and structures. Incremental innovations improve the profitability and efficiency of a company or organisation in the short term. Management and incentives aim at streamlining. Things are promoted by utilising existing information in a consensus-oriented manner, without wasting time and resources. In the co-creation of organisations, the Mediator Circle manages the process, holding the reins of incremental innovation from the beginning to the end.

Disturbing new signals and radical innovations often cause fear and even anxiety, since they do not fit the current way of thinking or the prevailing methods of management or reward. However, they cannot be ignored, since ideas that challenge the existing system and information are the raw material of radical innovation and are likely to help create new business.

In most cases, a radical innovation comes about quietly over a long period of time and has many creators. Sometimes it is a sum of coincidences. A long-term process requires the ability to maintain the passion and determination of the community to complete radical innovations. The management must commit itself to the innovation, even though the benefits cannot be measured beforehand and there are no systematic practices for evaluating them.

Leaders who create something new are like Michelangelo contemplating a piece of rock: They have to be able to see the David in there and know what they must cut off in order to reveal the statue. Creative leadership also involves the self-direction of people, self-organisation of communities, plural leadership and swarm intelligence.

People who are passionately innovative and self-directed do not need the Mediator Circle to run the routines of the innovation process. The creation of a radical innovation requires the Mediator Circle to be skilful facilitators and able to create a multi-voiced creative process.

When a city starts to follow the principles and operating model of co-creation in co-operation with other actors, implementing the change requires all the actors to exhibit leadership. In addition, the commissioning and continuous development of the operating model require management. In an organisation that favours open innovation, the top management is typically a patron that supports the change of organisational culture and adoption of a new operating method. The diagram below highlights the significance of management in launching the co-creation operating model, supporting its implementation and evaluating its effects. The operating method also requires each party to commit itself to the active leadership of its own activities.
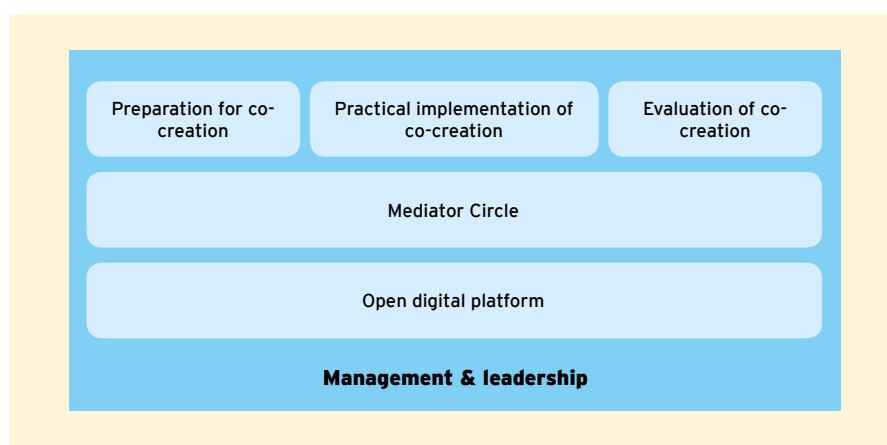
Management of co-creation

The establishment of the co-creation operating model throughout the entire city organisation requires support measures and structures. What is needed:

- a team of mediators, or Mediator Circle, which supports, encourages and, if necessary, coordinates the (mainly self-directed) co-creation processes
- An open digital platform enabled by interactivity
- Co-creation management and leadership.

Tips for successful implementation

- **Extend or deepen the urban ecosystem.**
  Co-creation makes use of existing multi-actor ecosystems. However, sometimes it may be appropriate to build new ecosystems. For example, during experiments, the homes of residents interested in co-operation may be temporarily linked as part of the rest of the ecosystem.

- **Ensure that all the parties benefit.**
  All parties must be able to benefit from the co-operation. Those who feel they will benefit are also prepared to invest and share the risks. An open attitude and learning through experiments are the surest means of producing benefits.

- **Recognise the roles and responsibilities of co-creation participants.**

- **The city's operations-oriented management generates trust.**
  The creation of innovations and networked activities are based on trust. Development based on trust requires operations-oriented management.

- **Encourage!**
  According to research, encouragement from the management, commitment of leading office-holders, freedom of action and the organisation's willingness to reform are considered the most important factors affecting the success of experiments. The highlighted characteristics of experimental culture include an open, trusting, pro-development, encouraging and creative atmosphere.

- **Invest in facilitation.**
  Recognising and reconciling the various needs, development orientations and operating methods of co-creation participants requires efficient facilitation. It is also required for creating value in co-creation.

- **Prepare for sufficiently long time spans.**
  Companies should be aware that when the city is involved, all development decisions and acquisitions must be subjected to the city's thorough, statutory decision-making process, which takes time.

- **Make use of the MyData model.**
  Making use of the Internet of Things (IoT) is currently a strengthening trend. Meaningful services produce meaningful data that can be utilised in the development work. In the MyData model, people can see the data that has been collected about them and, at the same time, permit a third party to use the data.

- **Invest in self-direction, since its significance is highlighted as we approach the era of artificial intelligence and robotics.**
  Self-direction helps make the operations of organisations more efficient, increase employee satisfaction and take care of the company's ability to reinvent itself. Leadership in innovation ecosystems is more important than managing innovation ecosystems.

- **Also make use of digital meeting places.**
  The city does not need to be a place for working and consuming only. It can also allow for multifaceted development, use of services and creation of new business at the same time. Digital meeting places and tools are the first cost-efficient step in developing scalable solutions sought in global competition.

Preparation for co-creation

Roles of actors at the various stages of co-creation management

Co-creation requires a group of various actors: residents, representatives of the city's sectors and units as well as representatives of companies, institutes of higher education, associations and other communities. These are also certain kinds of roles, and an employee may, of course, be a resident at the same time. In this section, roles refer to sets of tasks that are the responsibility of the person acting in each role. Several people may have the same role, and one person may have several roles simultaneously or one after another.

In this section, roles have been divided into four "acts": (1) launching the co-creation method, (2) initial stage of the co-creation process, (3) implementation stage of co-creation and (4) utilising and sharing the learning and experiences as well as commissioning the innovation (Utilisation stage in the table below).

Numerous roles have been identified for Living Lab actors. For example, Nyström et al. (2014) analysed 26 Living Labs and recognised a total of 17 roles. We present 10 roles that cover the four aforementioned "acts" and are particularly significant in co-creation processes in which one of the actors is the city.

Role	During the preparation stage	At the beginning of the implementation stage	During the implementation stage	During the utilisation and evaluation stage
Patron	✕	✕		✕
Advocate	✕	✕		✕
Orchestrator	✕			✕
Network weaver	✕	✕		✕
Coordinator		✕	✕	
Co-operation builder		✕	✕	
Integrator			✕	
Group facilitator		✕	✕	
Messenger			✕	✕
Evaluator			✕	✕

Roles of actors at the various stages of co-creation management (X refers to a significant role at that stage)

Role assignment for the preparation stage

Patrons have power in their organisation on the basis of both their position and their respected leadership. The role of a patron may also be played by opinion leaders and pioneers whose visions are relied on. Patrons are also referred to as promoters: they inspire and encourage co-creation. They communicate that co-creation is important strategic work. They are entitled to decide on providing sufficient resources – time and competence – for co-creation. In addition, patrons communicate that co-creation always involves risks, the results are uncertain and any resulting solutions may prove unsuccessful. Patrons are responsible for ensuring that the organisational culture supports risk-taking and strengthens the ability to tolerate uncertainty. Patrons see co-creation and learning by experimentation as part of their daily work.

According to a survey by the Association of Finnish Local and Regional Authorities, municipal decision-makers thought that the following factors had the greatest influence on the success of experimental activities by municipalities: the organisation's willingness to reform, commitment of leading office-holders and encouragement from the management. The same respondents regarded actors in their own municipality as the most important partners in experimental activities. Actors most often mentioned as the most important were the top management of the municipality, employees of the municipality and customers using services. The results confirm the significance of the patron role.

Advocates actively share positive information about the co-creation operating model outside their organisation or community. A number of advocates are needed at the launch stage, not just within the city organisation but also among all

the different actors. Without advocates, the operating model will not spread more widely.

Orchestrators organise and arrange things, promoting in practice what patrons and advocates talk about. At the launch stage of the operating model, the role of orchestrator is played by the Mediator Circle with its diverse expertise. If the role of orchestrator is not played by anyone, co-creation will be only talk from the very beginning.

Along with orchestrators, network weavers are needed at the launch stage to ensure that the operating model quickly moves from talk to action. Network weavers decide who is to be contacted and which actors should be involved in the co-creation process at the first stage. Network weavers must have a strong understanding of co-creation and a clear vision of what the world of co-creation will look like in a couple of years.

Initial role assignment for the implementation stage

The initial stage of the co-creation process comprises the first three sets of tasks in the operating model: the starting points for co-creation, assembling the network of actors and planning the practical implementation. In this "act", the roles could be those of patron, advocate, network weaver, coordinator, co-operation builder and group facilitator. The same role may be played by several people at the same time, and one person may have several roles, including simultaneously. The roles are constantly changing, just as in many other things in co-creation.

At the initial stage of the co-creation process, the role of a patron is probably best suited for the unit management in the city organisation and the supervisor of the team. The patron may also be a political decision-maker, the managing director of a company involved in the process or the rector of an institute of higher education. The advocate talks about the importance of the co-creation approach and development need. The network weaver promotes the assembly of the network of actors.

When the network of actors has reached a mutual understanding about the development need and the targeted effects, what is needed is a coordinator who coordinates the planning of the implementation and, for example, permits and agreement issues. The coordinator also ensures that information describing the users and operating environment can be utilised by all. The role of coordinator may equally well be played by a resident or a representative of the city, company or other actor.

Even though the role of coordinator is important, the roles of co-operation builder and group facilitator are critical in terms of the success of the co-creation process and, in particular, the uniqueness of the innovation to be developed. The operating model highlights the significance of interaction and dialogue at the planning stage.

Co-operation builders promote the establishment of trust-based relationships between the actors in the network. They are interested in the goals and abilities of the other actors and are capable of taking the interests of various parties into account. They are able to mirror these against the development need on which the co-creation is based and the targeted effects of the new solution. For this reason, co-operation builders help all the actors see their own goals and input in relation to the shared objective of the network of actors. Co-operation builders want to share their own knowledge and receive and utilise other actors' knowledge. They have strong social skills and they are socially flexible.

At the initial stage of the co-creation process, group facilitators support the transformation of the network of actors into a group with a shared objective. They listen and are empathetic. They understand that building trust between actors takes its

time. Facilitators can make use of tools and methods that keep co-creation participants open to new, alternative ideas, including at the initial stage.

Role assignment for the implementation stage

At the implementation stage of co-creation, the roles of coordinator, co-creation builder and group facilitator are still important. The group facilitator introduces the methods and tools of service design into the process. If the network of actors does not have such expertise, the role of facilitator can be played by a hired company or, for example, service design students from universities of applied sciences or universities.

Messengers do not necessarily take part in the actual co-creation process, but they take forward the learning and ideas gained, already during the process. This way, they promote the success of the utilisation stage.

Co-creation in accordance with the operating model includes constant evaluation. Due to this, evaluators are required for the implementation stage.

Role assignment for the utilisation and evaluation stage

The utilisation stage of co-creation comprises the last two parts of the operating model: a) utilising and sharing the results, experiences and learning gained during the co-creation process and creative commissioning of the innovation and b) monitoring and evaluation of the effects of using the innovation. At this stage, the patrons, advocates, orchestrators and network weavers return to the stage.

The patrons and advocates continue communications in accordance with their roles. The orchestrator may start organising a public procurement at this stage. The network weaver may look for new partners in order to scale the innovation.

The messenger is an avid content producer on the Digitori platform and in social media. The evaluator concentrates on evaluating the long-term effects of the operating model and innovations.

Co-creation is target-oriented co-operation that involves several actors and roles. The process provides a wide variety of people with the opportunity to participate, have an influence and learn.

Practical implementation of co-creation

The generic operating model of co-creation describes the stages of the co-creation process from consideration of the starting points to monitoring the effects of using the innovation (see the figure below). This manual describes the most important tasks at each stage. The operating model highlights the significance of interaction, since co-creation involves actors with different backgrounds whose (professional) identities and competences are different. Shared new significance is created by means of dialogue. A common language and shared significance are built hand-in-hand as the trust between the actors grows stronger.

Starting points of co-creation
Assembling the network of actors for co-creation
Planning the practical implementation of co-creation
Practical implementation of co-creation
Utilisation of the co-creation results and experiences as well as creative commissioning of the innovation
Monitoring the effects of using the innovation
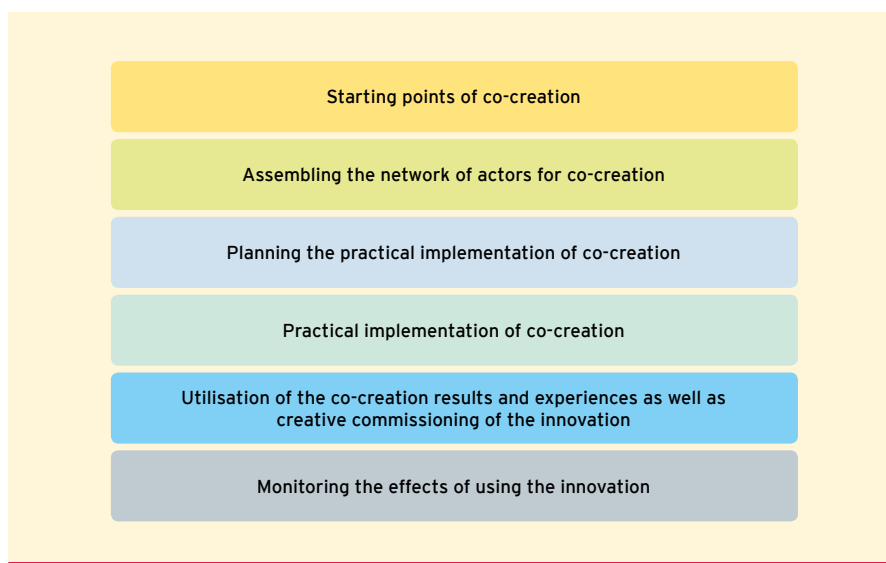
Stages in the co-creation operating model

The co-creation process may be interrupted at any time. Due to this, a number of arrows could be drawn in the figure; for example, it is possible to return from the implementation planning stage to the beginning, or the implementation stage can be interrupted if an intermediate evaluation reveals that the targeted effects will probably not be achieved. In all cases, co-creation has brought new learning and experiences, so an interrupted process is not a failure.

Starting points

The starting point for co-creation is a preliminary development need or development target. For example, new solutions are needed for these (in Finland in June 2017):

- How might we make young people and students aware of the challenges of posture when they spend so much time using computers and smartphones?
- How might we support the balance in the daily lives of school-aged children when their parent is diagnosed with cancer?
- A lack of computer skills is becoming a threat to citizens' well-being. How might we prevent this?
- What could we do differently to support phenomenon-based learning in upper comprehensive school?

Impulses for specifying development needs or challenges can also be received by studying solutions that are already available or under construction. A development challenge may be based on intuition, an inkling of various opportunities and the ability to see something that does not exist yet. Past co-creation processes and their output presented on various digital platforms as well as descriptions of companies and other organisations interested in co-creation may act as stimuli when the city's units and communities ponder what we could do differently.

If a development need is recognised and raised by a city employee or organisation unit, the preliminary discussions usually consider the current situation and future challenges a little more extensively. The development need is mirrored against scenarios, future business models and city strategies. If the preliminary development need or development target is recognised by an actor other than a user of the service or product in question, discussion with the future or potential users is recommended.

Co-creation is performed by a multi-actor group, and all the actors are not necessarily very familiar with the daily lives of the users or the operating environment of the service or product to be improved. For example, schools and day-care centres have traditionally been very closed environments. For this reason, user and context descriptions are needed from the outset. Strong customer understanding is the cornerstone of co-creation.

Multi-actor co-creation in genuine environments is not always the best way to solve a development need. Due to this, we initially discuss what kinds of benefits and targeted effects can be expected in relation to the resources required for co-creation. What other options are there?

The conclusion reached may be to start a challenge competition open to everyone about the preliminary development need. In Finland, challenge competitions have recently been organised to find solution options to major problems, in particular. For example, the main themes of Helsinki Challenge in 2017 were Sustainable Planet, People in Change and Urban Future. The Finnish Innovation Fund Sitra

organised the Ratkaisu 100 challenge prize competition to find solutions for better recognition and use of competence. In Espoo, residents were asked for help in developing a city district: "How might we make Espoo Centre a bit more lively, pleasant or beautiful?" The residents submitted their ideas using the Mun Idea application.

One option is to place a development challenge on the Experimental Finland project's Place to Experiment website. On the website, anyone can comment on development challenges and provide ideas for solutions.

Cities, companies and other organisations may also recognise new development targets or develop their own activities by taking part in international competitions organised to decide who gets to act as the development or pilot environment for a new technology, product or service, thereby gaining a competitive advantage before other actors. For the time being, such competitions are mainly funded by the European Union, but pilot activities have also been commercialised.

Assembling the network of actors

Previously, co-creation was often limited to co-operation between two actors. For example, health centres or hospitals co-created and tested the products and services of one company, so the process involved the representatives of the company as well as staff members and clients from one unit of one public sector actor. In this handbook, we emphasise the innovation ecosystem, for which reason the co-creation process begins by assembling a network of actors.

The first parties invited to join the co-creation process are often familiar actors whose values, goals and competence are already known. It is assumed that co-operation is easy when you know each other. The preliminary development need determines whether new actors are needed and, if so, what kinds of actors.

Example: Teachers at a comprehensive school have been discussing what they could do differently to strengthen extensive learning skills in accordance with the new curriculum. These skills include: (1) Thinking and learning to learn, (2) Cultural skills, interaction and expression, (3) Looking after oneself and daily life skills, (4) Multiliteracy, (5) Information and communication technology skills, (6) Working life skills and entrepreneurship and (7) Participation, exerting influence and building a sustainable future. The people that they first invite to join the development work are a representative of the city's information and communication technology (ICT) teacher network, representative of the city library and board member of the parents' association. When discussing the development need, the leader of the Mediator Circle suggests that they invite a representative of the local residents' association and the leader of a recreational club. The former has ideas about how the city residents can participate in building a sustainable future, and the latter is very good at assessing how schoolchildren can look after themselves.

In addition, the leader of the Mediator Circle suggests the development need to be presented to start-ups specialising in the development of learning solutions. These companies can be reached via the xEdu business accelerator. The teachers and members of the Mediator Circle also discuss whether the implementation stage of the process requires, for example, knowledge of ideation tools, facilitation skills for co-creation workshops, assessment skills for pedagogical solutions or the latest research data. Abilities matching these needs might be found from local institutes of higher education.

Even if a suitable group of co-creation partners is recognised, it is still recommended to announce the development need at least on the Digitori co-creation platform in order to reach other colleagues and users who have recognised the

same development need as well as companies and communities interested in developing a solution for the need or challenge. Visitors to Digitori will get a quick overview of the topical development needs as these are published in a concise and specified form. The following items should be included when publishing the development need:

- Development need in your own words
- Primary users and operating environment of the targeted solution
- Development need as a "How might we" question
- Targeted benefits and effects
- Preliminary schedule

The development need can be summarised into a "How might we" question. In a way, forming alternative "How might we" questions forces you to assess whether the development need has been defined too widely or narrowly. Following the above example, we can ask "How might we" questions, such as:

- How might we strengthen the extensive learning of learners?

- How might we strengthen the following skills of lower comprehensive school pupils both in and outside school: (1) Thinking and learning to learn, (2) Cultural skills, interaction and expression and (3) Looking after oneself and daily life skills?

- How might we strengthen third-graders' skills in looking after themselves and daily life skills as well as their information and communication technology skills using games played during lessons on the school's iPads?

The first question is very extensive; it covers a wide variety of learners from children in day care to senior groups at adult education centres and does not concentrate on strengthening skills. An excessively extensive development challenge is difficult; it is hard to know where to even begin the co-creation process. The third question, on the other hand, limits the possible solutions to games played on a certain type of device only. A too narrowly delimited development challenge restricts creativity. The effects of the new solution will probably also be limited. The question clearly specifies the skills to be strengthened.

The second question specifies that co-creation is to be carried out with lower comprehensive school pupils (grades 1–6). A group specified like this may seem extensive, like "learners" in the first question, but this expression opens up opportunities for solutions in which, say, sixth-graders have different roles than first-graders, even if the solution is the same. In addition, the second question specifies the context of learning and the operating environment of the solutions to be developed: both in and outside school. Accordingly, the network of actors in co-creation requires, for example, representatives of parents/guardians, hobby instructors and the city's cultural department and sports department in addition to representatives of the school and companies.

The "How might we" questions can be assessed by answering the following questions:

- Does the question concentrate on the targeted effects?

- Does the question enable a spectrum of different solutions?

- Does the question take into account the operating environment and any limitations?

In most cases, co-creation is interesting and inspiring, and new things are inevitably learned during the process. Co-creation is always target-oriented, so the "How might we" question must be worded such that the targeted effects are clearly specified. If the spectrum of solutions is very tightly limited from the outset (like above: games played during lessons on iPads), it might be more sensible to look for finished or nearly finished solutions on the market and concentrate on modifying them in co-operation with the supplier of the solution and representatives of the school.

After publishing the development need, the network of actors may grow. Co-creation is characteristically dynamic: the composition of the network of actors may change during the co-creation process. One actor may withdraw and be replaced by another or others as necessary. The last set of tasks at the assembly stage is familiarisation with the users and their daily lives. If the network of actors includes actors unfamiliar with the operating environment of the new solution, consider whether it might be possible to observe or "shadow" the users even before starting to plan the practical implementation of co-creation in order for everyone to have a shared understanding of the development need and context.

Co-creation is target-oriented co-operation between people. In practice, this means that actors committed to co-creation have enough time – for example, the right to spend the necessary number of working hours on the process according to the operating model. The "necessary number" is nearly impossible to specify accurately in advance, since we are dealing with a living process aiming at creating something new. Interaction between the development partners is essential in order to reach a shared understanding – and this inevitably takes time. In some cases, assembling the network of actors requires not only agreement about the participants' time management but also decisions on where substitutes can be found if, for example, nurses working in home care do not have time for their daily visits to clients because they need to participate in co-creation workshops.

Assembling the network of actors may also begin by a company or association contacting either representatives of the Mediator Circle or the city's units directly and presenting its own idea for a product, service or operating method that it wants to start developing with the city. So far, companies have been particularly interested in testing a nearly finished product or service with real users, in day-care centres or home care, for example. This is referred to as validation. When the initiative for assembling the network of actors for the co-creation process comes from outside the city organisation and the idea to be developed already exists, the process still starts with the first stage of the operating model: considering whether there is a development need and whether an approach based on co-creation is the best match for this exact case.

Planning the practical implementation

All actors participating in co-creation have their own objectives whose achievement is supported by the product, service, operating method or process developed together. Cities strive to strengthen their vitality and competitiveness, companies seek new customers and growth, associations are interested in the well-being of their members, and individuals want a good life for themselves and their loved ones. Discussions at this stage about common visions and shared values save time later and also make the innovation ecosystem sustainable in the long term.

Before the actors start planning any practical measures, mutual discussions are carried out to specify the goals, targeted benefits and effects of the co-creation process from the perspective of the various actors. In particular, the targeted effects may be a bit different from what was first thought, since the output and

effects partially depend on the abilities of the people and organisations eventually taking part in the process.

A co-creation implementation plan is a clear and concise document that can be easily modified in the course of the process, such as an Excel spreadsheet or Word table. The plan does not need to be watertight, since changes, coincidences and other surprises are part of the nature of co-creation.

A few basic questions should be answered when preparing the implementation plan. The "Who" question refers to the distribution of work between the actors; who is responsible for which task. The "Which" question covers the users participating in the various stages of the innovation process from ideation workshops to testing functional prototypes; do we want dozens of users, both professionals employed by the city and residents in their various roles? Who is responsible for recruiting these people and providing them with instructions and, for example, support for using an application to be tested?

The "What and how, where and when" questions refer to the implementation of the co-creation activities. These include various workshops, experiments and tests, assessments and business model planning meetings. The schedule is an important issue to be agreed on. In practice, it has often been noted that schedules desired by start-ups and SMEs in particular are too tight for the city's units, which have their own annual rhythm. It is mainly a question of being able to start the planning stage early enough so that implementation can take place at a time that suits all parties. If tens or hundreds of users are to be involved in the process, plenty of time must be allowed for recruitment and various arrangements.

The resources required by the implementation may be personnel resources and machines, equipment, Internet connections, cloud services and accessories (flip charts, pens, Post-it notes, Lego blocks, picture cards and other ideation tools). Workshops and other events also require some catering.

Openness is one of the basic principles of co-creation. Communications are agreed on when preparing the implementation plan in order to gain a mutual understanding of what can be communicated independently, what may require permission (for example, parents/guardians' permission to use photographs of children) and what communications are restricted by data security regulations, for instance. In data security and protection as well as permit issues, those preparing the implementation plan are assisted by representatives of the Mediator Circle and, through them, by the city's other specialists.

Goals and evaluation go hand-in-hand. The achievement of goals is evaluated throughout the co-creation process, not just at the end of it. The dimensions and indicators used in the evaluation are decided before starting the implementation. In addition, at least the intermediate evaluation date is agreed on. The co-creation process may be stopped immediately after the intermediate evaluation by the mutual decision of the parties if it seems that the targeted benefits and effects will not be achieved. The evaluation plan covers evaluating both the solution to be developed and the entire process.

A written co-creation agreement is made between the city and the other actors. The agreement specifies, among other things, the copyrights and intellectual property rights (IPR) for the solution to be developed, including copyrights, patent rights, trademark rights, utility model rights and model rights. Even though documents are created when planning the implementation of co-creation, the main thing is the interaction between the co-creation partners in order to build and strengthen a shared understanding, significance and language.

Practical implementation

The implementation proceeds according to the plan – or not. The latter case is often reality in co-creation processes. An iterative approach is acceptable, enabling changes on the basis of observations made and experiences and learning gained. When coincidence is given a chance, something unpredictable and useful may happen (serendipity).

The actors must be able to tolerate uncertainty and be prepared for changes. Since the co-creation process rarely proceeds straightforwardly and on schedule like a train, the significance of interaction is highlighted. The necessity of changes and new measures are discussed and agreed on together, since the activities of one actor affect the co-creation partners in any case.

There are a large number of guides and websites concentrating on the organisation of ideation and co-creation workshops, arrangement of tests and use of service design tools. For this reason, this handbook does not delve into the practical details of implementation. A list of guides and other materials to get you started is provided at the end of the handbook. The only way to learn which method or tool works the best in various situations and between various actors is by testing.

The implementation stage ends with the final evaluation, which assesses both the solution resulting from the co-creation and the co-creation process itself. Moments of joy experienced during the process, challenges faced and learning and insight gained are collected – preferably by discussing together again – and shared within the participants' immediate circle and work community. In addition, the solutions, learning and experiences are presented on the Digitori platform, making use of texts, drawings, photos or videos.

Utilisation and sharing of the results, experiences and learning as well as the creative commissioning of the innovation

The output and experiences are communicated more extensively within the city organisation at, for example, open co-creation events organised by the Mediator Circle. The solutions developed are introduced not only on the Digitori platform but also at showroom events open to everyone.

If the co-creation results in a new product or service, the company may promote the product or service using a "Co-created with the City of…" stamp or similar, provided that the city has given permission for this.

Monitoring the effects of using the innovation

The final stage in the operating model is monitoring the effects of using the innovation. On the following spread, there is the co-creation operating model on the left and a related checklist in a table on the right.

Starting points of co-creation

Preliminary development need or development target

Discussion with users

Benefits of multi-actor co-creation and targeted effects

Assembling the network of actors for co-creation

Assembling the network of actors for co-creation

Resources and abilities of own organisation and other key actors already identified

Resources and abilities of mediators

Communicating the development need in order to identify the necessary partners

Familiarisation with the users and their daily lives
Discussion between co-creation partners to establish a shared understanding, significance and language

Planning the practical implementation of co-creation

Further specifying the goals, targeted benefits and effects of co-creation with the partners

Preparing a co-creation implementation plan: who, what, how, when and the resources required for the implementation

Communications plan: who, what, to whom, where and when
Evaluation plan
Data security and protection requirements
Agreements

Interaction between co-creation partners to strengthen the shared understanding and language

Implementation of co-creation

Constant interaction with the co-creation partners

Iterative approach: continuous evaluation and preparedness for changes

Final evaluation: reaching goals, joys and challenges experienced, learning and insight, further measures

Utilisation and sharing of the results, experiences and learning as well as creative commissioning of the innovation

Utilisation of the results, experiences and learning by all co-creation partners

Sharing of the results, experiences and learning

Creative commissioning of the innovation

Monitoring the effects of using the innovation

Co-creation operating model

Checklist	Agreement template or other template

☐ Ideas from the Digitori platform

☐ Similar completed/ongoing processes (see Digitori, ask the Mediator Circle)

☐ Users' comments on the development need

☐ Comments by colleagues and the supervisor

☐ Connection with strategies

- Template for describing the preliminary development need

☐ Discussion with the Mediator Circle

☐ Do the actors' competences complement each other?

☐ Resources of own organisation's representatives: right and opportunity to spend a sufficient number of working hours

☐ Substitute arrangements (if necessary)

- Development need template

If necessary:
- Observation plan template

- Agreement template for observation or "shadowing"

☐ Permits required

☐ Data security and protection issues

☐ Insurance

- Evaluation criteria template

- Agreement template for co-creation

- Photography consent template

If necessary:
- Implementation plan template

- Agreement template for storage of user information

☐ Premises and supplies for workshops, etc.

☐ Collection and storage of feedback during the process

☐ Communications: social media and Digitori

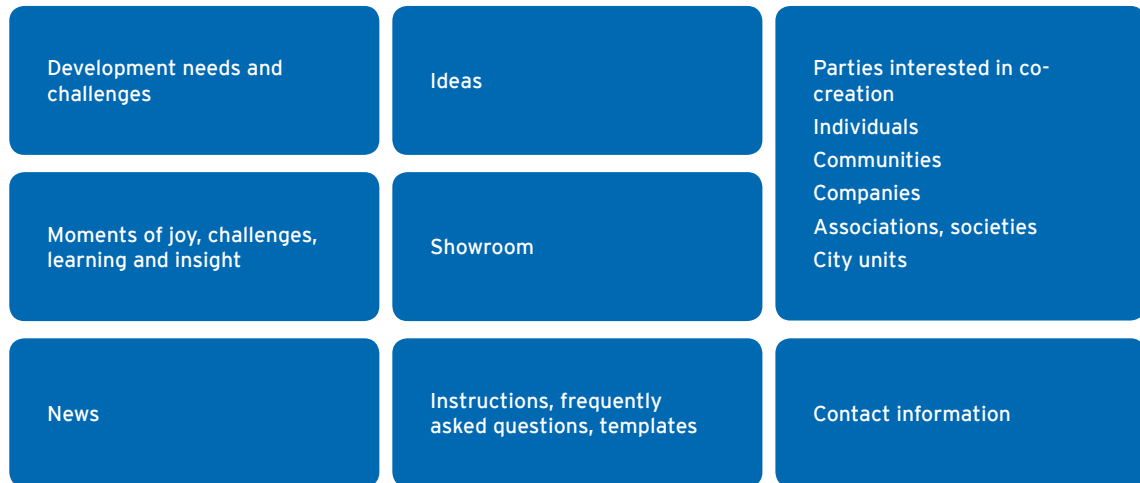☐ Presentation at an open co-creation event

☐ Presenting the product or service at a showroom event

☐ "Co-created with the City" stamp for the company

These things must be taken into account during the preparation and progress of the process. The implementation is supported by creating templates for the needs arising at the various stages.

Operating model application checklists and agreement templates

Content of the Digitori platform

Designed for all actors participating in co-creation, the Digitori platform is an essential tool for the continuous development of activities, reinvention and sharing of the output. Digitori inspires and invites new actors, constantly evolves and adapts to new needs. Digitori's content elements are presented in the figure below. The figure is a proposal only, since Digitori is also built together with its users, hearing the users' needs and ideas.

Digitori platform for co-creation

| Development needs and challenges	Ideas	Parties interested in co-creation Individuals Communities Companies Associations, societies City units
Moments of joy, challenges, learning and insight	Showroom	
News	Instructions, frequently asked questions, templates	Contact information

Elements of the Digitori platform for co-creation

As a platform supporting co-creation, Digitori must enable the interaction of visitors. In addition, virtual offices are needed for the ongoing co-creation processes at each time, allowing the participants to work together and exchange views and experiences.

Scaling the operating model

The implementation of the co-creation operating model usually proceeds in stages. For example, it can be agreed that the co-operation first involves just two or three parties (e.g. city, resident, company) and is for a certain purpose, such as testing new solutions. The co-operation can be extended later on by adding stages to the product or service development process (determining the needs, ideation, concepting, validation, commercialisation and commissioning) and increasing the number of participants. The roles and responsibilities of co-creation participants may also vary.

The figure below depicts a situation in which the city's health centre is developing the usability of the city's internal patient information system together with city residents as well as patient and family caregiver associations. With the residents' permission, data produced by their health technology equipment, such as blood pressure meters, is connected to the patient information system. In the first stage, the health centre takes part in recognising and determining the needs of the various parties together with the city residents and associations. In this example, the solution ideation stage also involves researchers, who were invited to provide information about various technical implementation opportunities. In this

example, concepting and concept testing (experimentation) has been taken care of without companies and research institutes. Researchers are again involved in the validation stage, after which the companies and associations join the process to commercialise the solution and scale it for the global market.
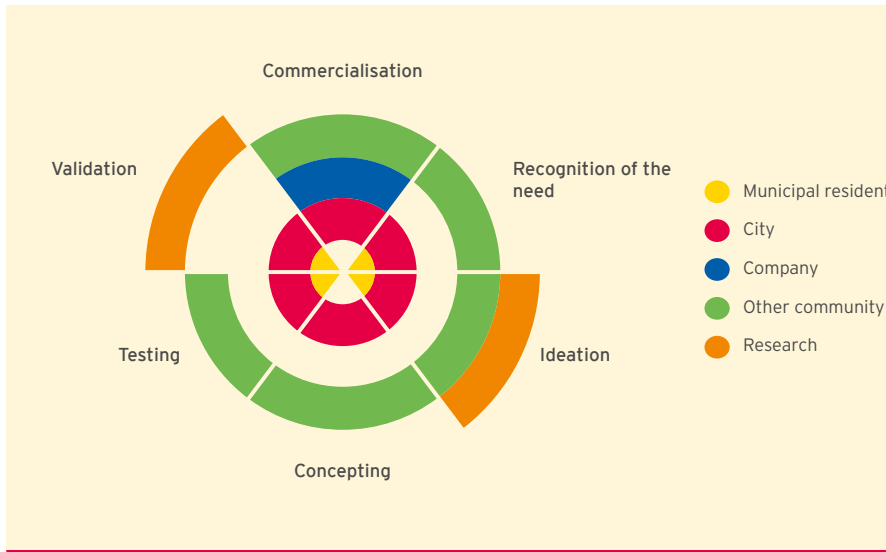
Example of city-led co-creation

The next example depicts a company-led co-creation process, where the company is developing a new digital learning product in co-operation with the schools of the city. In the first stage, the company collaborates with researchers in the education field and takes part in both the city's curriculum work as well as observing the operations of the school and associations that organise leisure activities for young people. Learners at the school observe, collect learning-related situational information and take part in determining the need. In this example, all other parties except the researchers take part in the second stage, ideation of the new, innovative learning product. The product concepting work is the responsibility of specialists in pedagogical research together with a company in the field. In this example, the learners, school and company take part in testing the product concept. Validation is the responsibility of a researcher specialising in evaluation together with the company, and it happens in another city. The company commercialises the new learning product.
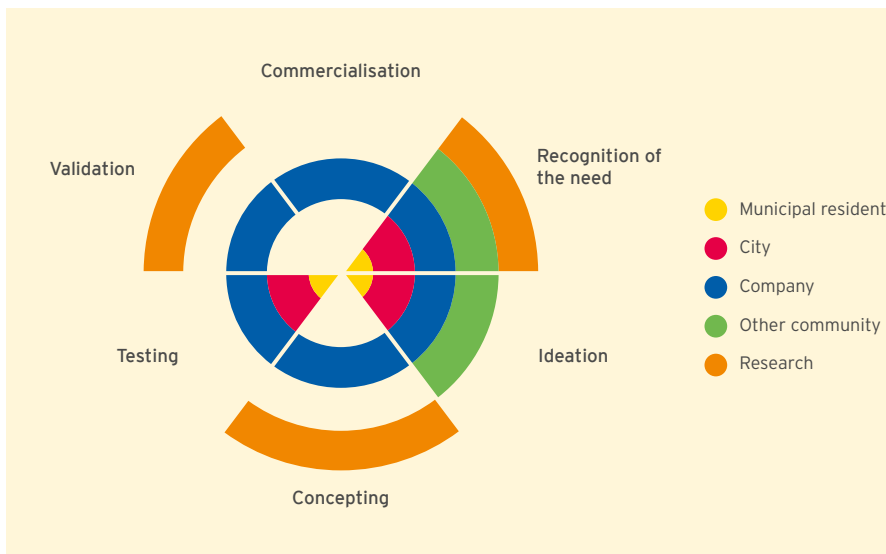
Company-led co-creation project

It is important to note that, in co-creation, companies, associations and residents in the city can together make use of the urban environment and its various innovation, business and other ecosystems without the city organisation acting as the initiator of co-creation. However, in order to yield good results, co-creation always requires some kind of organised facilitation.

Co-creation and experimental activities that transcend the borders of cities, regions and countries are also needed, especially if the goal is to create scalable solutions and new markets.

Path towards international co-operation:

1. It all starts with small, separate experiments within one sector in a single city. Then, in another city, in accordance with the Six City Strategy.

2. A willingness to establish co-creation as part of the procedure within one sector in a single city. The management of the sector acts as the patron. At the same time, some other cities implementing the Six City Strategy are taking similar steps.
   - Resources for support measures: guides, Mediator Circle within one sector, Digitori platform.

3. A willingness to expand the co-creation operating model to all sectors of a single city. The management of the city acts as the patron.
   - A clear link with the city's strategy, objectives and processes.
   - Resources for support measures: guides, training events, social media, regional and sector-specific Mediator Circles. A city-level Digitori platform serving in Finnish, Swedish and English.
   - Investment in showroom activities for the output of co-creation, i.e. innovations.
   - Evaluating the operating model and monitoring the long-term effects of the operating model and the co-created innovations at the city level.

4. Close co-operation with the cities involved in the Six City Strategy.
   - Uniform support measures and structures. Uniform operating model for the cities involved in the Six City Strategy, network of Digitori platforms and network of mediators.
   - Procedures for implementing shared co-creation processes between several cities.

5. International co-operation.
   - Presenting the co-creation operating model on international forums.
   - Expanding the content of the English Digitori platform such that it also serves international actors.
   - Marketing the city's Digitori platform in communications to international actors.
   - Procedures for involving international actors in the co-creation processes carried out in Finland.
   - Scaling the model similarly to open source code – it can be changed, but all changes are public.

Example of co-creation with compensation

This section describes the important steps that the organisation should take when starting to develop products or services together with companies and other actors. The process leads from preparation to evaluation. The description also presents the main stages relating to procurement if compensation is paid for the co-creation.

| 1. Preparation | → | 2. Procurement stage | → | 3. Co-creation | → | 4. Evaluation |
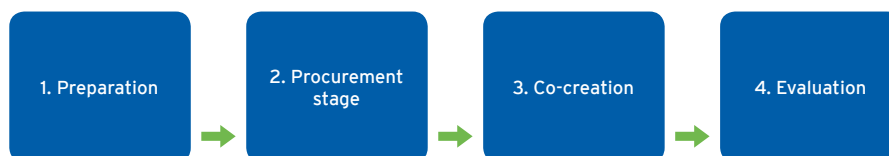
Need for co-creation

The idea and need for co-creation or experimentation may come from either the company or the city/municipality. The need results from a situation in which new ideas and innovations are wanted to support activities or a service but the actors do not know what exactly is being sought. A company may be developing a product or service and would like to hear future end-users' views on user-orientation before the innovation is ready for the market.

When a municipality is determining its need for co-creation, it must assess whether the development will be carried out without compensation, in which case the development partner will not be paid for the co-creation or experiment. The organisation may also be prepared to pay the company for the resources used for co-creation, such as personnel working hours, supplies or the use of applications. In the event of co-creation with compensation, the preparation must take into account public procurement regulations and publish the appropriate procurement procedure, if necessary.

In general, co-creation works on the no-compensation principle, with both the developing and experimenting party seeking their own interests. A municipal organisation may receive essential information on technologies under development and promote their development in a direction that suits its own needs. A company may, for example, get to use its development partner as a reference.

During the preparation, the type of operating environment in which the co-creation is carried out must be determined. For example, a school or day-care centre as a development partner and environment places special requirements for companies; the employees of the development partner must prove that they can work with underage children (e.g. parents/guardians' permission, extract from the criminal record). The organisation's own specialists may provide information on publication consent as well as data security and protection.

| Need for co-creation | → | Specifying the development need | → | Preparation for the procurement process |

Procurement procedure

Compensation paid for co-creation may require an appropriate procurement procedure. If the value of the co-creation procurement exceeds the national threshold value (€60,000 excl. VAT), the procurement must be carried out in accordance with the Act on Public Procurement and Concession Contracts (1367/2016). If the value of the procurement is below the limit value, the organisation's valid guidelines on procurement and principles of good governance should be followed, along with the necessary documentation.

The procurement process begins with publishing a procurement notice and invitation to tender. The invitation to tender specifies, among other things, the co-creation needs/targets, tender submission period, co-creation schedule, compatibility conditions for tenderers, comparison criteria for tenders and draft of terms and conditions. Where applicable, the process should allow time for an information session or answering questions. At the same time, it must be remembered that all tenderers need to be treated equally, meaning that the same information should reach all interested parties.

Preparing the invitation to tender and procurement notice	→	Publishing the procurement notice and/or invitation to tender	→	Information session

Tenders received by the deadline will be taken into account in the tender comparison. The tenders are first checked for compliance with the invitation to tender and meeting the compatibility conditions. The tenders that meet these conditions proceed to the comparison stage. The tenders are rated according to the comparison criteria specified in the invitation to tender. The grounds for the selection are specified in the procurement decision, which is communicated to all tenderers at the same time, usually by e-mail. More detailed information on the procurement procedure, threshold values and appeal period is available on the procurement notice website, for example.

Tender acceptance	→	Compliance with the invitation to tender and meeting the compatibility conditions	→	Tender comparison
Procurement decision	→	Communicating the procurement decision	→	(Appeal period)
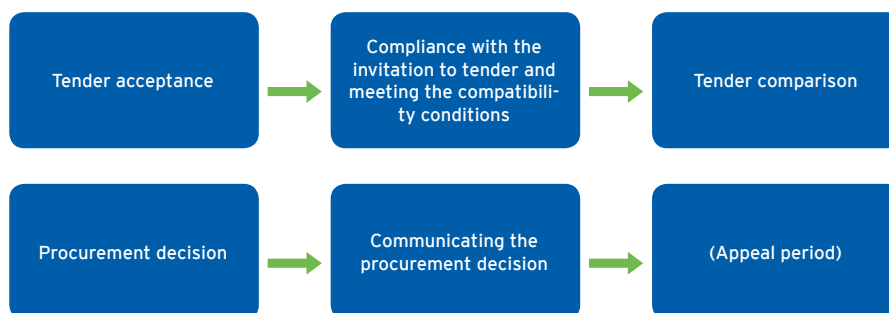
Agreement negotiations

When the procurement decision has been communicated to all tenderers, agreement negotiations can be started. It is a good idea to agree on co-creation in writing, even if no compensation is paid for the co-creation or experiment. It is useful to document the targeted benefits of each party in the agreement, so they can be returned to in the final evaluation, for example. The agreement specifies the more detailed development target and the contact persons responsible for the agreement. It is also important to agree on intellectual property rights in writing. Conditions regarding data security and protection as well as insurance usually belong to the standard phrases in public sector agreements. In connection with the agreement negotiations, it is important to determine whether personal data will be collected during the experiments and how the company will deal with the responsibilities relating to the personal data file.

Preparation for agreement negotiations	→	Signing the agreement	→	Implementation/co-creation

Implementation and evaluation

After signing the agreements, it is time to start the co-creation process or experiment. Smooth co-creation requires a facilitator or coordinator who is responsible for the completion of the development work as agreed as well as evaluations. It is also useful to share the learning and experiences gained during the co-creation in the organisation's internal networks.

A company's co-creation reference can be linked to the evaluation process: when the company has experimented the product or service developed in accordance with the mutually agreed procedure, it is entitled to use the reference granted by the organisation.

Co-creation may benefit the municipality equally well as the company, which often receives valuable information about user experiences that can be used to accelerate the development work. Co-creation may support the organisation's strategic goals and help seek new solutions for promoting the municipality's vitality and competitiveness, for instance.

| Continuous feedback and intermediate evaluation | → | Evaluation/ co-creation | → | (Evaluation/change in activities) |

CASE ESPOO

Espoo's agile experimentations: co-creation with compensation

For Espoo's agile experimentations programme, a national procurement notice and invitation to tender were published in HILMA. The invitation to tender requested the description of the targets of agile experimentations, the schedule and the compatibility and selection criteria. A preliminary draft agreement was appended to the invitation to tender.

The invitation to tender specified the compatibility criteria for tenderers as well as the selection criteria. The tenders received were assessed and rated together with specialists from Espoo's Education and Cultural Services as well as the Mayor's Office. A procurement decision was prepared on the selections and communicated to all tenderers.

The draft agreement appended to the invitation to tender was used as a template for the co-creation agreement. The agreement detailed the experimentation target, schedule and implementation plan. The content of the agreement was also discussed in order to ensure that both contracting parties have a similar understanding of the contents of the agreement. In Espoo's co-creation agreements and experiments, the intellectual property rights lie with the company. There has

not yet been a situation in which co-creation would have resulted in a completely new solution that would necessitate a further review of ownership. However, the City of Espoo has reserved the right of ownership to documentation of the results of experiments, such as progress reports, resources used and feedback received.

The experiments started in mid-April, and an intermediate check was carried out at the co-creation workshop. Before this workshop, companies were asked to provide a short intermediate evaluation of how the experiments were proceeding; "what was learned and how we will continue." The co-creation workshop compiled the learning and experiences gained so far and further specified upcoming developments. After this, experiments were continued with schools and a day-care centre.

Espoo's agile experimentations programme concluded in a final evaluation workshop. Before that, companies were asked to carry out a final evaluation of the co-creation process together with their development partner on the KYKY Digitori platform. At the workshop, the entire experiment was evaluated together from the initial situation to the final situation.

# Measurement of the effectiveness of co-creation

It is most useful to schedule the planning of the actual measurement for the needs determination stage, so the goals can be specified such that they are measurable from the very beginning and the monitoring methods and responsibilities can be decided when the goals are set. A representative of each actor should be involved in deciding about the indicators; this increases commitment to monitoring the goals and provides a sufficiently extensive knowledge base for setting the indicators. This handbook includes a co-creation measurement tool based on the following specifications.

Background for measuring the effectiveness

Productivity (relationship between investments made and results achieved) and overall efficiency (achievement of qualitative and quantitative goals set) can be measured by reviewing the relationship between the goals set, measures performed and changes achieved. In the measurement of the productivity and overall efficiency of services in particular, the definition of goals is essential in order to achieve a reliable measurement result.

The measurement of co-creation is based on analysing the chain of effects, in which the need detected and the goals deduced from it are expected to guide the selection of measures to be performed and the effects of these. In the "Hyvän mitta" project implemented by Arvo Association and the We Foundation, for example, the chain of effects has been specified as follows:

Indicators can be determined for the productivity and overall efficiency of co-creation according to the following process:
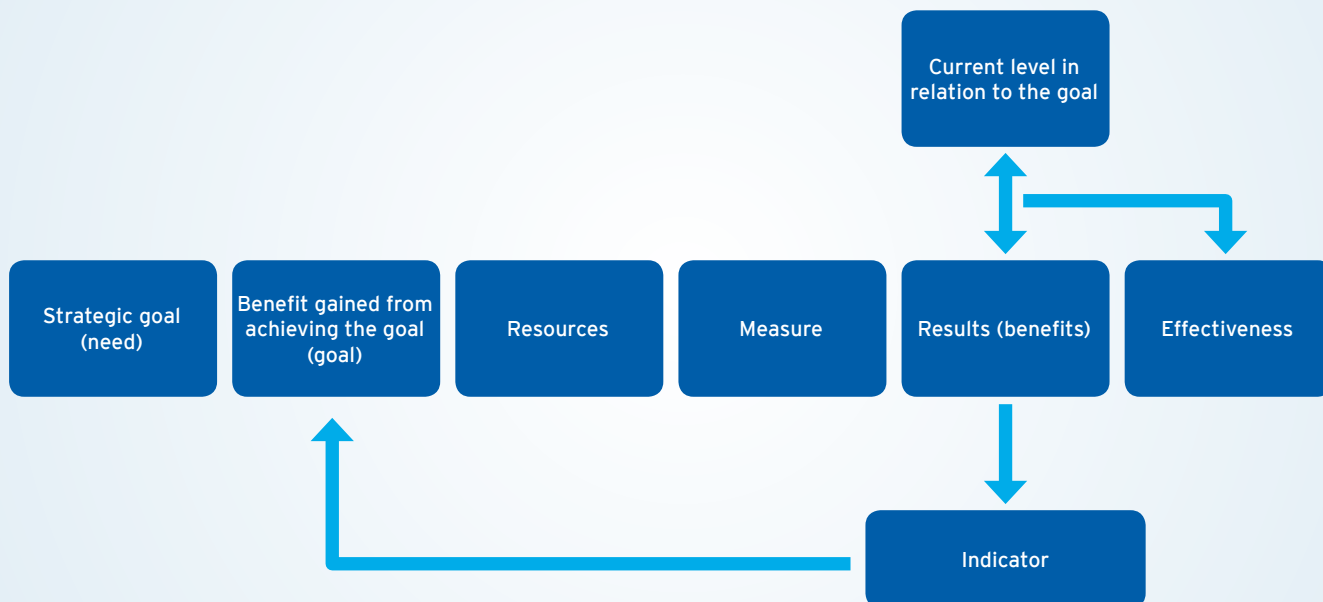
Measurement process based on setting goals

The effects are assessed according to the views presented in the municipality's management reference architecture for:

- companies
- residents (individuals)
- community and society
- environment (responsibility viewpoint).

Strategic goals do not necessarily guide the activities in a sufficiently concrete manner in terms of improving overall efficiency and productivity, so it is more useful to base the measurement on the targeted benefits to be achieved through the strategic goal. The recognised and targeted benefits can be considered measurable objectives for which a target level is set. The actual indicator must indicate progress in the direction of the recognised benefit.
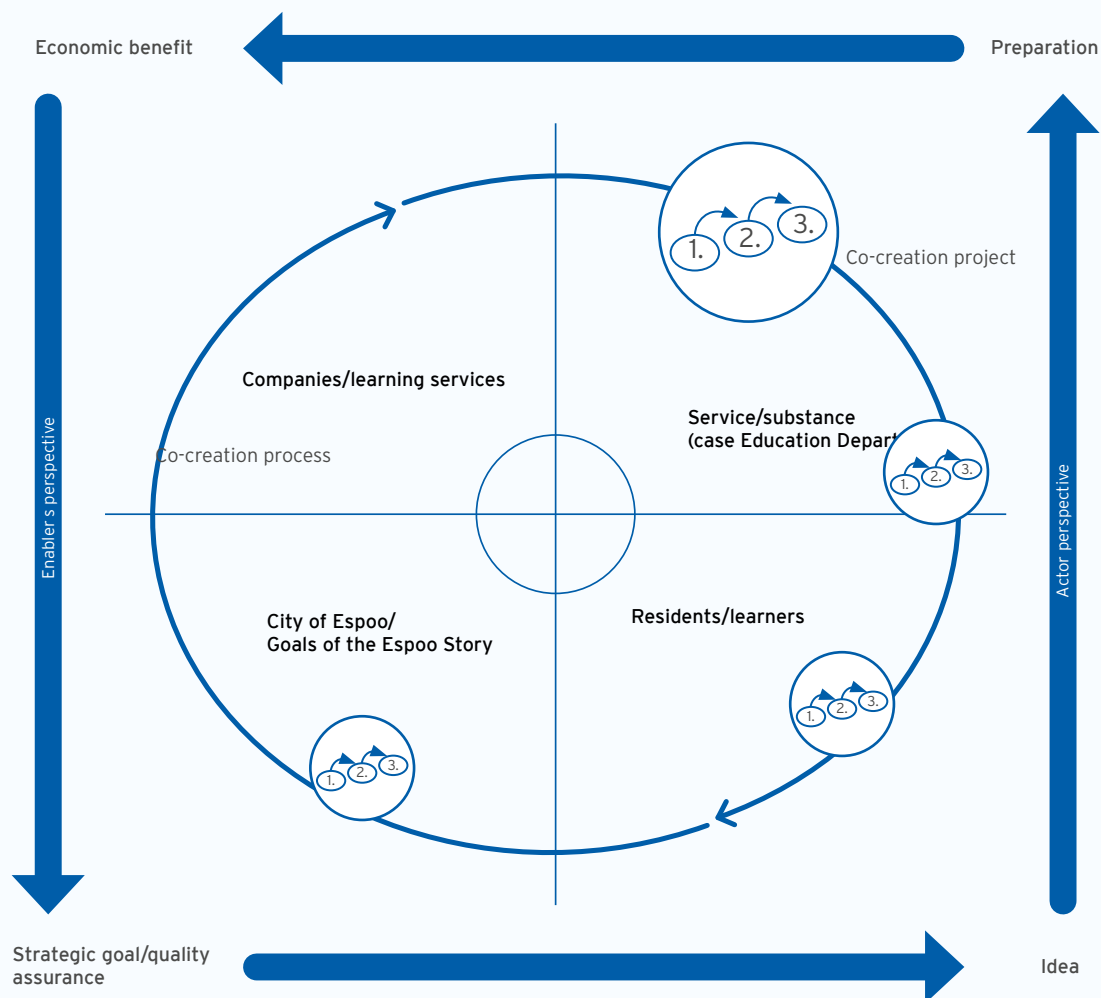
The measurement tool guides towards measurement based on goals at the level of the city (city strategy), sector to be measured (sector story) and profit centre under review (profit centre story). For each level, indicators of overall efficiency and productivity are determined from the four perspectives of the balanced scorecard (BSC):

- customer
- finances
- processes and services
- growth and learning.

For each goal to be measured, it is necessary to assess the factors preventing or slowing down the achievement of the goal that should be taken into account. Careful risk assessment is necessary in the process of setting goals, and it is important to identify the key risk for each goal measured in the measurement process.

Measurement of effectiveness

The measurement model indicates the actors taking part in co-creation, their roles and the key themes to be observed in the measurement. Co-creation starts from an individual idea predicted to solve an existing problem or meet a need observed. By means of co-creation, the idea is turned into measures expected to yield economic benefit to companies and meet residents' needs in accordance with the municipality's strategy.
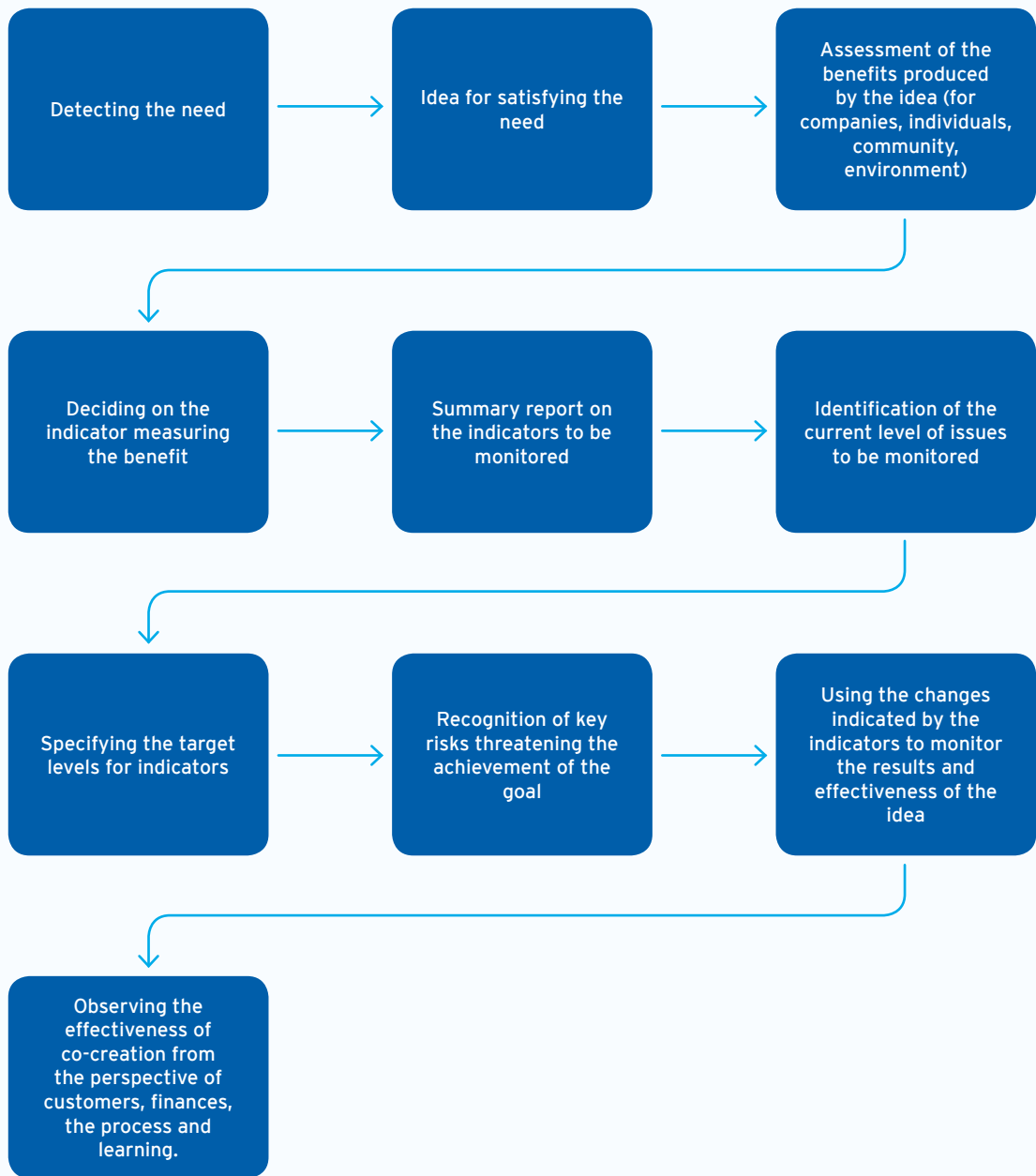
Economic benefit ← Preparation

Co-creation project

1. 2. 3.

Companies/learning services

Service/substance
(case Education Depart...

Co-creation process

1. 2. 3.

Enabler's perspective

Actor perspective

City of Espoo/
Goals of the Espoo Story

Residents/learners

1. 2. 3.

1. 2. 3.

Strategic goal/quality assurance → Idea

Measurement model for the effectiveness of co-creation

When the measurement takes into account the municipality's management reference architecture, BSC perspectives and effectiveness goals at the City of Espoo, sector and profit centre level, the effectiveness measurement process proceeds as follows:

Detecting the need	→	Idea for satisfying the need	→	Assessment of the benefits produced by the idea (for companies, individuals, community, environment)

Deciding on the indicator measuring the benefit	→	Summary report on the indicators to be monitored	→	Identification of the current level of issues to be monitored

Specifying the target levels for indicators	→	Recognition of key risks threatening the achievement of the goal	→	Using the changes indicated by the indicators to monitor the results and effectiveness of the idea

Observing the effectiveness of co-creation from the perspective of customers, finances, the process and learning.

Measurement of effectiveness

Co-creation measurement in Espoo

The co-creation measurement tool consists of the following tabs:

- Instructions
- Goals
- Effects on the company
- Effects on residents
- Effects on society
- Effects on responsibility
- Summary
- Indicator report

Testing the measurement

The use of the measurement tool was tested at the project steering group's second workshop. The example case selected was the operating model for target-oriented learning, and the tool was reviewed at the profit centre level.

The measurement of the idea was carried out according to the tool's instructions. The productivity and overall efficiency indicators identified at the first workshop were used to support the work. However, it was noted at the beginning of the work that the indicators must always be tied to the goals and, therefore, cannot be decided before the goals are recognised and determined. In the example description's measurement, the tool did not yet include a risk factor threatening the achievement of the goal but, as the work progressed, the risk perspective was found to be an essential part of the measurement. The risk perspective was added to the tool on the basis of feedback received from the workshop.

The purpose of example measurement was to simulate the progress of the measurement process using a real example. The workshop participants defined indicators monitored at the profit centre level from all perspectives of the municipality's management reference architec-ture. About an hour was spent on the simulation. The short time spent on the measurement did not allow for contemplating the opportunities of implementing the monitoring and the sources of data available. In addition, it was noted that taking various perspectives into account in the simulation was deficient due to the missing of company representatives, for example. The measurement simulation resulted in an indicator document concerning the target-oriented learning operating model and tool.

The simulation proved that the measurement process specified as the basis for the tool guides the specification of the goals to be measured as well as the indicators showing the productivity and overall efficiency of the goals. In addition, it was noted that the measurement process supports the strategic goals of the Six City Strategy and the City of Espoo.

After the simulation, participants in the workshop noted that the measurement tool works as a tool for co-creation and strategic management in accordance with the goals. The tool can be extensively utilised as a management tool at various levels of the city organisation, both in specifying the indicators for co-creation and in daily management.

It is most useful to schedule the actual measurement for the needs determination stage, so the goals can be specified such that they are measurable from the very beginning and the monitoring methods and responsibilities can already be decided when the goals are set. While the measurement process was estimated to be realised well through workshop work, each actor should be represented when deciding on the indicators in order to increase commitment to the monitoring of the goals and base the indicators on sufficiently extensive knowledge.

Results of co-creation

KYKY project for accelerated co-creation by schools and companies

Results and effects of KYKY activities

KYKY activities are a unique way of opening up the public sector's activities to open co-creation between the public, private and third sectors. It ensures that everyone involved in the development work benefits and gains added value for participation in the activities. KYKY activities accelerate the creation of new services based on platform economy and their scaling for the global market.

KYKY activities consist of a standardised, systematised operating model, which has simplified and clarified the opening up of several statutory services to co-creation: terms of use, rules and agreements have been created that enable parties to join development activities fully openly if the minimum legal conditions are met. Thanks to the standardised operating model, the activities can be constantly improved.

KYKY information is shared actively. KYKY Digitori is a digital platform open to everyone where the supply and demand of various actors meet openly and where values are created. It has had 4,644 visitors during the year.

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Results and effects from the perspective of entrepreneurs, companies and business life

- **33** companies have participated in KYKY activities
- **10** companies have received the "Co-created with the City of Espoo schools" certificate
    - 3DBear Ltd
    - Activergo Oy
    - Aittokoski Oy
    - Ceedco Oy
    - Finpeda Oy
    - Lyfta Oy
    - Mehackit Oy
    - Qridi Oy
    - SkillzzUp Oy
    - The Mighty United Oy
- **25** products introduced into the market
- Start-ups growing and internationalising
    - Average increase in number of employees **3.7 -> 6.4**
    - **1-2** international actors have joined each
    - Each has found **3** international partners
    - **15** start-ups have received capital injection amounting to **€2.6 million**
    - Growth in Finnish customers **74%**
    - Growth in international customers **49%**
    - Users and customers in **47** different countries
- Boosted product development and improved work productivity
- Improved product quality, quality reliability and market value
- Facilitated access to new distribution channels
- Market value of companies' products has increased
- Business growth even tripled
- Customer data utilised more efficiently in developing various products
- Strengthened the company's image as a positive, socially responsible and customer-oriented company
- Boosted companies' networking with each other and cities

Results and effects from the perspective of schools and learners

- KYKY activities are open to everyone:
    - **55** schools/year

- 10 events with over **400** participants/year

- KYKY activities support the phenomenon-based implementation of the new curriculum and changes in schools' activities.

- KYKY activities create significant efficiency and better customer experiences.

- Tested, co-created solutions reduce unsuccessful procurement.

- Individual service solutions enabled.

- Learning new technologies and development of digital skills improved.

- New solutions supporting learning have increased the motivation to learn.

- Learners have been able to influence digital development.

- Participation of learners increased.

- Self-efficacy of learners increases as they can see their own ideas in new solutions.

- Secured the reinvention of learning and teaching and staying at the forefront of digital development.

- New working method for developing the school's operating culture.

- The teacher saves one working hour per week.

- Learners support product development and business activities based on platform economy.

Results and effects from the perspective of society

- KYKY activities boost and support change in society and the creation and utilisation of new business operations by means of bottom-up activities.

- KYKY activities help companies scale for international markets.

- All actors in KYKY networks can take part in the development, commissioning and commercialisation of new products, bringing continuity to the production of new education technologies and adding value at the societal level.

- Co-created education technology solutions are built using open interfaces, thanks to which flexible and cost-efficient solutions can be scaled, thus activating exports.

- An alumni network with **28** companies and **55** mentors has been created around the xEdu business accelerator.

- New professions and new competence have been recognised, and new platform economy professions have already been created at both the city and companies.

- KYKY activities are about to be introduced in Oulu, Tampere and Turku, and nearly 10 other cities are interested.

Evaluations and experiences:

- "Learning and growth took place, both in the direction of the global citizenship phenomena studied and regarding the pupil's role as an active content producer in a unique digital learning environment."

- "From the teacher's perspective, it was highly rewarding to be able to collaborate with people who are pioneers in producing a new kind of learning environment and related contents. No training for VR and 360 competence development is available from the employer and not much otherwise either, so collaboration like this is essential for the school's development."

- "Competence in using new materials and producing digital materials increased."

- "The teachers found the experiments to be successful."

- "The environment supported phenomenon-based project work and the gamification of learning."

On the basis of the evaluation feedback from companies and schools, KYKY activities support all the extensive learning skills in accordance with the curriculum:

- Thinking and learning to learn (L1)

- Cultural skills, interaction and expression (L2)

- Looking after oneself and daily life skills (L3)

- Multiliteracy (L4)

- Information and communication technology skills (L5)

- Working life skills and entrepreneurship (L6)

- Participation, exerting influence and building a sustainable future (L7)

A handbook and video have been made about KYKY activities. Read more on Espoo's KYKY Digitori platform. The video can be found on YouTube under the title "KYKY– Koulujen ja yritysten kiihdytetty yhteiskehittäminen" (KYKY – Accelerated co-creation by schools and companies).

Mightifier♥ Espoo – a co-creation story

It all started with positive feedback from friends. Words have incredible power when a person close to you tells you why they appreciate you and describes a situation in which you have succeeded. In summer 2015, the Mightifier team visited schools to talk to principals and teachers and even dropped by at the ministry to ask how important they consider peer feedback to be. How and why would it be utilised, what kinds of tools are already used and how do they work?

Based on the discussions, the Mightifier team made a few sketches of the Mahtisluokka (Mighty Class) service, in which a beige backpack asked children to list their classmates' strengths. Espoo's Saunalahti School and Espoo International School boldly received the team to allow them to show the images and ask the pupils and teachers to provide feedback. The meetings quickly revealed that children are professional application developers! Ideas abounded, and it became clear that the backpack and its beige world must go and be replaced with colours. Lots of colours! A more interesting character would also be necessary. On the other hand, the character strengths at the core of the service felt like a good choice, and many were already familiar with the concepts and terminology.

The team received more feedback than expected, and carefully collected and stored everything. Even today, Mightifier's product development plan includes some of the children's ideas from the early meetings. In late 2015, the company started coding the first version, which was exceptionally named Minimum Lovable Product (cf. Minimum Viable Product) – after all, it was a service for children.

The first positive feedback rounds using a paper version of Mahtisluokka were made after the winter break. Oh, what lovely things the children wrote and drew for each other! It was a real learning experience for Mightifier's team to see how the children created the text, used the space reserved for drawings and choose the character strengths. We also carried out a little survey about the atmosphere in the classroom, since we wanted to find out whether it would be influenced by the use of the application. When it was finally time to test the application itself, the air was thick with excitement. In the first rounds at the schools, a coder from Mightifier was also present. The coder immediately received additional work, when a student got lucky in the draw and was paired with their best friend as feedback partners. Naturally, they thought of many good things to write about and eventually ran out of space. The coder was assigned the task of creating more space to even allow for extensive positive feedback.

The team was constantly in touch with the classes throughout the spring, received ideas and feedback from the pupils and teachers and was notified if the technology failed. The team got to observe how the application was used in the classrooms. We were happy to see the pupils delighted and many of the teachers were moved as they read the first beautiful observations the pupils had written about each other's behaviour. We ended the school year and the Mightifier pilot by printing out the feedback collected during the spring and handing it out to the pupils with their school reports. The effects on the atmosphere in the classrooms, development of self-esteem and growth in friendships were clear as we compared the results of the first

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well-being survey with the final one and heard the teachers' comments.

Many pupils said that the bear in the application seemed lonely. The team asked the children who the bear's best friend should be. The most popular answer was a bird! The Mightifier team designed several different versions for a new bear and bird. The children got to vote for their favourites and specify why they had chosen these exact characters. The result was Mighty Bear with its chubby cheeks and Brave Bird with its red sneakers.

The following winter, it was time for another development stage. It was easy to contact Espoo again, since we knew that the co-creation model worked well. We got to start developing and trying out the well-being survey with 80 school classes from Espoo. The classes used the application, now named Mightifier, on a weekly basis and our well-being survey once a month. At two workshops, we got together with teachers and principals to consider the structure of the survey and the resulting report, their viable applications now and opportunities to utilise the data in the future.

The Mightifier team received another unequalled learning experience. Without the city's systematic approach and distinct projects, an experiment like this could not have happened with a start-up company's resources. We are looking forward to the next co-creation project!

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Appendix 1

Living Labs and Makerspaces – what are they about?

Living Lab

This appendix describes the concepts relating to co-creation. The Living Lab concept often refers to multi-actor development and experimental activities. Terms like Fab Lab, Makerspace or Hackerspace also come up in discussions and texts, including in Finland. There are no established equivalents for these in Finnish.

The birth of the Living Lab operating model is linked with the development of the post-industrial society. The name Living Lab has its origins a home-like research environment created by the Massachusetts Institute of Technology (MIT) Media Lab. At the turn of the millennium, the European Living Lab concept spread out in the world through the European Network of Living Labs, which was the result of the initiative of the European Union, the Finnish Government at the time, Nokia and Finnish institutes of higher education.

The model was initially developed to understand people's everyday objectives, needs and challenges and solve problems in their actual living and working environment. The name Living Lab highlights a genuine, open environment instead of closed product development laboratories. Another essential feature is the involvement of users in the development of new products, services and processes, all the way from recognising the need or problem to the launch stage. A third feature is a multi-actor approach: various actors (residents, companies, communities, institutes of higher education, etc.) develop new solutions together. The Living Lab operating model is not limited to the development of companies' or municipalities' products and services; it may also result in social innovations or policy programmes, for instance.

The principles of the Living Lab model can be summarised as follows:

1. Co-creation is user-oriented, participatory and empowering.

2. Everyone is capable of innovation and creative utilisation of innovations.

3. A successful innovation requires people with different backgrounds and life experiences.

4. By making use of the Living Lab operating model, we can improve something that already exists or develop something completely new.

5. The Living Lab follows the principle of open innovation.

6. The actors decide together on the organisation of the co-creation project.

7. All the actors have the opportunity to participate in co-creation and innovation as well as the creative commissioning of innovations.

8. Co-creation is practical everyday work.

9. Multi-actor co-operation requires interaction.

10. Co-creation requires a systematic approach, coordination and flexibility.

11. In order for trust to be built between the actors, they must be interested in each other's practices and goals. The establishment of trust is promoted by creating a shared understanding and vision.

12. All the parties mainly perform the activities without compensation. However, Living Lab activities can also be implemented by means of agile experimentations programmes or similar, in which case the city, for example, acquires experiments and pilots corresponding to certain development challenges in accordance with the procurement legislation. Co-creation can also be organised as pre-commercial or innovative procurement.

In recent years, support from the EU and World Bank and the co-operation between the Living Lab networks of various cities have contributed to an understanding of how cities can open their development challenges and processes to their partners in accordance with the principles of open innovation activities. At the same time, solutions have been sought regarding the best way to ensure that the voices of both city employees and residents are heard, regardless of which department is responsible for which challenge and solution. The goal of these projects is not only improving the quality of the services and productivity of the city but also attracting international investments and companies to the city. Solutions created by means of international co-operation are piloted in culturally, juridically and commercially differing conditions, thus accelerating the fast scalability and commercial success of the solutions.

Thanks to the aforementioned merits, the Living Lab concept received the esteemed Innovation Luminary Award in the Open Innovation Infrastructure Creation category in spring 2016. The award winners are selected by a group of specialists consisting of representatives of the European Commission (Open Innovation Strategy and Policy Group) and the industry.

Open innovation platform

The meaning of the concept of open innovation platform is as yet unestablished. It can be understood as a mechanism that works as a co-creation tool when creating innovative solutions to the city's problems, needs and challenges. A key element is

co-operation between the city's various actors. Defined like this, "open innovation platform" means the same thing as "City as a Living Lab".

According to the Six City Strategy, innovation platforms are functional entities in which the urban community creates new solutions and new business together. Innovation platforms are characterised by a concrete time and place, clearly defined problem-solving process and people who generate activities that create value. New products and services are created and tested in real urban environments and innovation platforms. The Ministry of Economic Affairs and Employment summarises the concept in its report as follows: "An innovation platform usually refers to open collaboration carried out in a facilitated manner between actors from the public, private and third sectors in order to develop new products and services."

Fab Lab (fabrication laboratory)

The roots of Fab Lab activities are in the "How to Make (Almost) Anything" course, which was offered by MIT's Center for Bits and Atoms as early as in 1998. The Fab Lab concept was created on the basis of the course. From the outset, the idea has been to provide everyone with opportunities to utilise the latest technologies and tools in the innovation process. Fab Labs are still characterised by open, shared spaces, digital production tools and competence development.

The Fab Lab Foundation was established in 2009. The foundation offers support and services for the founders of Fab Labs and training for the users of Fab Labs belonging to the network. At the same time, it opens up opportunities for the commercialisation of innovations developed at Fab Labs. The Fab Lab network includes about 1,000 members from various corners of the world. Nowadays, the focus is on digital manufacturing opportunities: anyone can manufacture (almost) anything at a Fab Lab.

Fab Labs that belong to the international Fab Lab network must be equipped with a certain minimum amount of machinery, equipment and materials (3D printers, laser cutters, CNC routers, scanners, etc.). In addition, they must be open to all who wish to use them, at least part of the week. The members of the network have accepted the Fab Lab Charter. The members are expected to take part in the international network's activities (for example, video conferences, shared projects, Fab Academy). In Finland, this network only has two university members so far: Aalto Fablab and Fab Lab Oulu.

Makerspace (DIY workshop)

Library 10 in Helsinki has its Urban Workshop, and five libraries in Espoo have a Makerspace. These workspaces are open to everyone and can be used by any library customer for the projects they find significant, making use of the machinery and equipment free of charge. If necessary, guidance is available from the library employees and others working at the workshop. According to Espoo's Iso Omena Library, the Makerspace is a place for shared learning, teaching, creation, construction, tuning and experimentation. The Urban Workshop, on the other hand, refers to itself as "a makers' space where anyone can come and bring their ideas to life". Customers have access to some of same equipment as at Fab Labs (3D printers and laser cutters), but also sewing machines, a paper cutter and a laminator.

Open workspaces like this also represent the maker culture. In this context, a maker can refer to the manufacturer, creator and author. No proper Finnish equivalent has been found for the term. In Helsinki, an arts and crafts workspace named

Värkkäämö is available as part of the Youth Activity Centre, allowing young people to realise their ideas with the help of instructors or independently.

The maker culture is about doing things yourself by making use of the latest technology, open source code software, the global data network and communal open spaces. Today's makers are artisans of the digital era. The key characteristics of the Finnish maker culture are community, an open environment as well as learning and personal competence.

Libraries are natural environments for DIY workshops and makerspaces. The purpose of Finland's new Public Libraries Act, which entered into force at the beginning of 2017, is to promote people's equal opportunities for education and culture, availability and use of information, reading culture and versatile literacy, opportunities for lifelong learning and competence development. It is also the duty of libraries to promote active citizenship, democracy and freedom of speech. The starting points for achieving the goal are communality, diverse values and cultural diversity. In addition, the Act mentions that one of the duties of public libraries is to offer spaces for learning, hobbies, work and civic activities.

A Makerspace operating in connection with a library is a non-commercial space and community. However, working at the workshop may help people find development needs around which a multi-actor co-creation process can be built. Continued outside the library's Makerspace, the co-creation process may involve companies and prospective entrepreneurs. Makerspace work may result in business ideas and new companies. Indeed, small-scale entrepreneurship is highly valued in the international maker culture.

The maker culture is characterised by sharing, communality and community. The principle of sharing refers to both sharing plans and introducing the products created. A DIY culture festival named Wärk:fest has been organised in Finland twice (2012, 2013), and Espoo Mini Maker Faire took place in 2015. In autumn 2017, another Mini Maker Faire was organised as a joint effort between Wärk Association, Aalto Fablab and Espoo's Iso Omena Library.

In the United States, political decision-makers see the maker culture, DIY workshops and Maker Faire events as means of strengthening entrepreneurship, reforming local production and increasing regional innovativeness. President Obama hosted the first Maker Faire at the White House in 2014.

Supported by the Catalan regional government (Diputacio de Barcelona), the 224 libraries and 10 mobile libraries in the area have established a project named BiblioLab. BiblioLab produces Living Lab and Makerspace services for 2.7 million residents. By making use of co-creation, experiments and creative methods at BiblioLabs, citizens can implement projects and produce information, prototypes and innovations to create solutions for not only technology and art but social and scientific problems as well.

Hackerspace (hacklab)

A hackerspace, or hacklab, is a DIY space similar to the makerspaces described hereinabove. In Finland, hacklabs are workspaces maintained by enthusiasts in which the members of the hacklab can implement their own projects using the shared equipment available. In 2017, there were hacklabs in 12 Finnish cities.

Helsinki Hacklab operates in the Helsinki Metropolitan Area. According to its rules, the organisation "pursues developing and advancing hobby possibilities in science, technology, arts and manual skills for its members and neighbouring areas. In addition, the organisation pursues operating and advancing radio

amateur activities. To achieve its objectives, the organisation seeks to arrange space and tools for member use." Tuesday nights are open to everyone, including non-members. In 2017, the membership fee was €35. However, the operating expenses are mainly covered by monthly fees for key members (€40/month). Helsinki Hacklab has organised the Hacklab Summit three times, which was intended for all Finnish hacklab communities and other interested parties.

The www.hackerspaces.org website is a platform for the international hackerspace community, an unofficial network of local hacklab communities. According to the website, there were approximately 1,400 active hackerspace communities in the world in 2017.

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#MakeWithEspoo product family

The results of the experiments conducted in Espoo to create tools of development, management and consulting according to the City as a Service objective.

City as a Service

Frameworks
describe the background and theoretical framework of development

- **Framework for the innovation management of ecosystems**
- **Framework for customer information knowledge management**
- **Management reference architecture**

Handbooks
provide models and examples for the use of city developers

- **Handbook for open participation**
- **Handbook for co-creation**
- **Handbook for the production and utilisation of customer information**
- **Handbook for competence management**
- **Handbook for multi-channel public services**
- **Handbook for electronic customer service support**
- **Kuntakanvas**

Application examples
present concrete implementations in Espoo

- **Iso Omena Service Centre as an innovation platform**
- **Innovation showroom**
- **Data privacy and opening data securely**
- **KYKY – accelerated co-creation by schools and companies**
- **KIPINÄ – Connection map of operations and data systems**